



US006671904B2

(12) **United States Patent**  
**Easterling**

(10) **Patent No.:** **US 6,671,904 B2**  
(45) **Date of Patent:** **Jan. 6, 2004**

(54) **SURGICAL TABLE TOP AND ACCESSORY CLAMP USED THEREON**

(75) Inventor: **Barry A. Easterling**, Wadsworth, OH (US)

(73) Assignee: **Steris, Inc.**, Temecula, CA (US)

(\*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 68 days.

(21) Appl. No.: **10/292,360**

(22) Filed: **Nov. 12, 2002**

(65) **Prior Publication Data**

US 2003/0061660 A1 Apr. 3, 2003

**Related U.S. Application Data**

(62) Division of application No. 09/699,812, filed on Oct. 30, 2000, now Pat. No. 6,499,158.

(51) **Int. Cl.**<sup>7</sup> ..... **A47B 71/00**; A61G 13/12

(52) **U.S. Cl.** ..... **5/601**; 5/732; 108/27

(58) **Field of Search** ..... 5/601, 600, 621-624, 5/731, 732; 108/27

(56) **References Cited**

**U.S. PATENT DOCUMENTS**

- 2,212,156 A 8/1940 Erdley
- 3,046,072 A 7/1962 Douglass, Jr. et al.
- 3,339,913 A 9/1967 Anderson
- 3,386,444 A 6/1968 Brenner et al.
- D221,910 S 9/1971 Brendgord
- 3,981,492 A 9/1976 Hallmann
- 4,018,412 A 4/1977 Kees, Jr. et al.
- 4,069,813 A 1/1978 Gilula
- 4,122,587 A 10/1978 Weiss et al.
- 4,143,652 A 3/1979 Meier et al.
- 4,145,612 A 3/1979 Cooper
- 4,146,793 A 3/1979 Bergstrom et al.
- 4,221,371 A 9/1980 Kuphal
- 4,287,422 A 9/1981 Kuphal et al.

- 4,346,298 A 8/1982 Dixit
- 4,355,631 A 10/1982 LeVahn
- 4,487,523 A 12/1984 Monroe
- 4,547,092 A 10/1985 Vetter et al.
- D287,625 S 1/1987 Brendgord et al.
- 4,698,837 A 10/1987 Van Steenburg
- 4,765,583 A \* 8/1988 Tenner ..... 108/43
- 4,796,846 A 1/1989 Meier et al.
- 4,805,202 A 2/1989 Deucher et al.
- 4,901,964 A 2/1990 McConnell
- 4,936,836 A 6/1990 Weickgenannt
- 4,971,037 A 11/1990 Pelta
- 5,014,969 A 5/1991 Schaefer
- 5,016,946 A \* 5/1991 Reznikov et al. .... 312/108
- 5,029,826 A 7/1991 Schaefer
- 5,077,780 A 12/1991 Lee, Jr.
- 5,078,705 A 1/1992 Edwards et al.
- 5,090,044 A 2/1992 Kobayashi
- 5,097,132 A 3/1992 Plummer
- 5,127,339 A \* 7/1992 Hood, Jr. .... 108/43
- 5,279,603 A 1/1994 Everett et al.
- 5,287,575 A 2/1994 Allen et al.
- 5,337,760 A 8/1994 Nichols
- 5,367,730 A \* 11/1994 Sher ..... 5/732

(List continued on next page.)

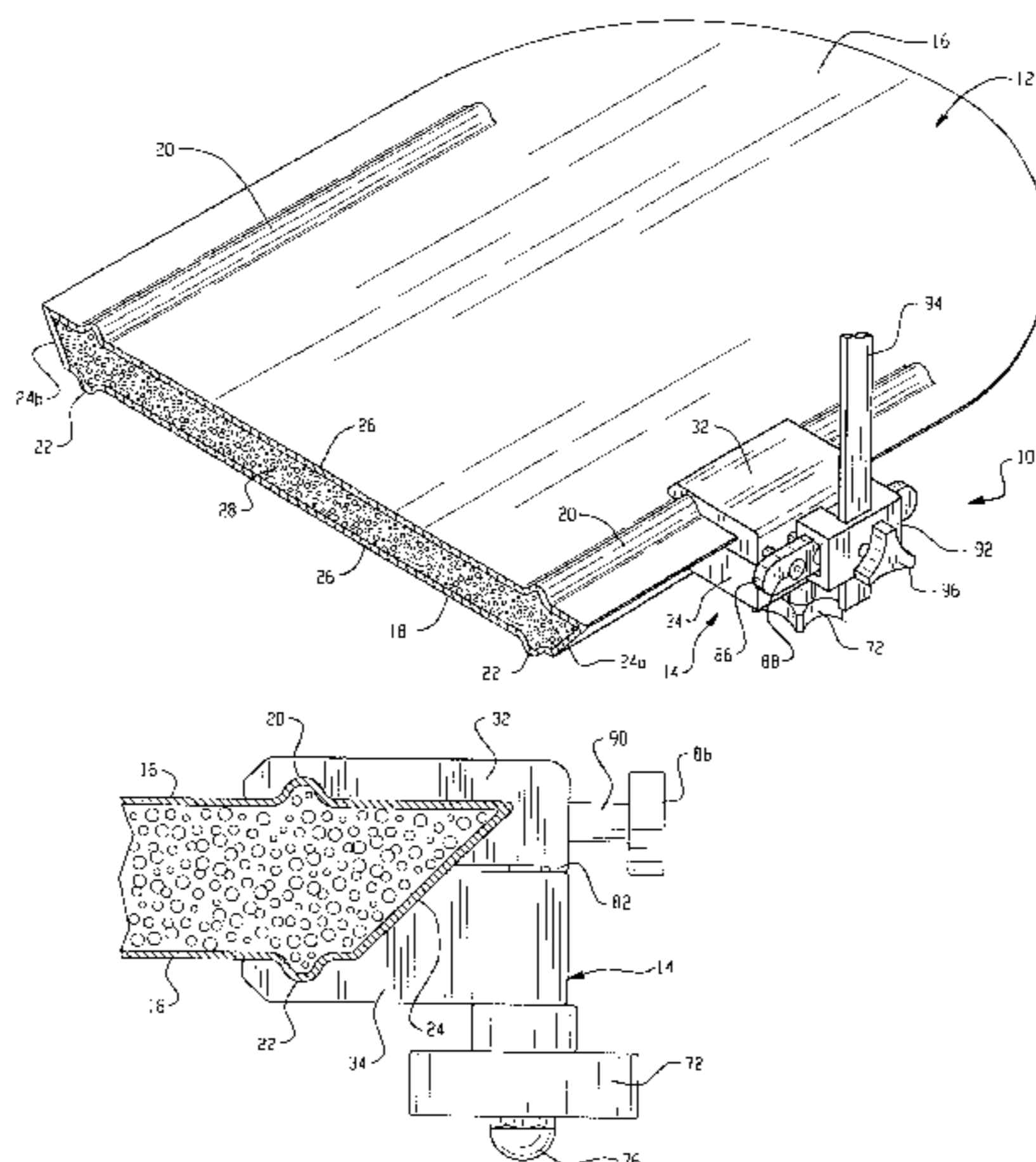
*Primary Examiner*—Alexander Grosz

(74) *Attorney, Agent, or Firm*—Fay, Sharpe, Fagan, Minnich & McKee, LLP

(57) **ABSTRACT**

A medical accessory clamping system includes a table and an accessory clamp. The table has an upper surface and a lower surface, a first ridge positioned on the upper surface and a second ridge positioned on the lower surface of the table. The accessory clamp has a first clamping member and a second clamping member coupled to but separate from the first clamping member wherein the clamping members define a cavity for receiving a portion of the table. The first and second clamping members have recesses for receiving said first and second ridges of the table, respectively. A uniquely styled clamp and a table are also disclosed.

**48 Claims, 5 Drawing Sheets**



# US 6,671,904 B2

Page 2

---

## U.S. PATENT DOCUMENTS

5,400,772 A	3/1995	LeVahn et al.	5,771,513 A	6/1998	Kirchgeorg et al.
5,535,973 A	7/1996	Bailey et al.	D408,537 S	4/1999	Stickley et al.
5,538,215 A	7/1996	Hosey	5,983,426 A	11/1999	Vanek et al.
5,581,830 A	12/1996	Schwieker	6,023,800 A	2/2000	Stickley
5,613,254 A	3/1997	Clayman et al.	6,260,220 B1 *	7/2001	Lamb et al. .... 5/601
5,701,991 A	12/1997	Helmetsie			

\* cited by examiner

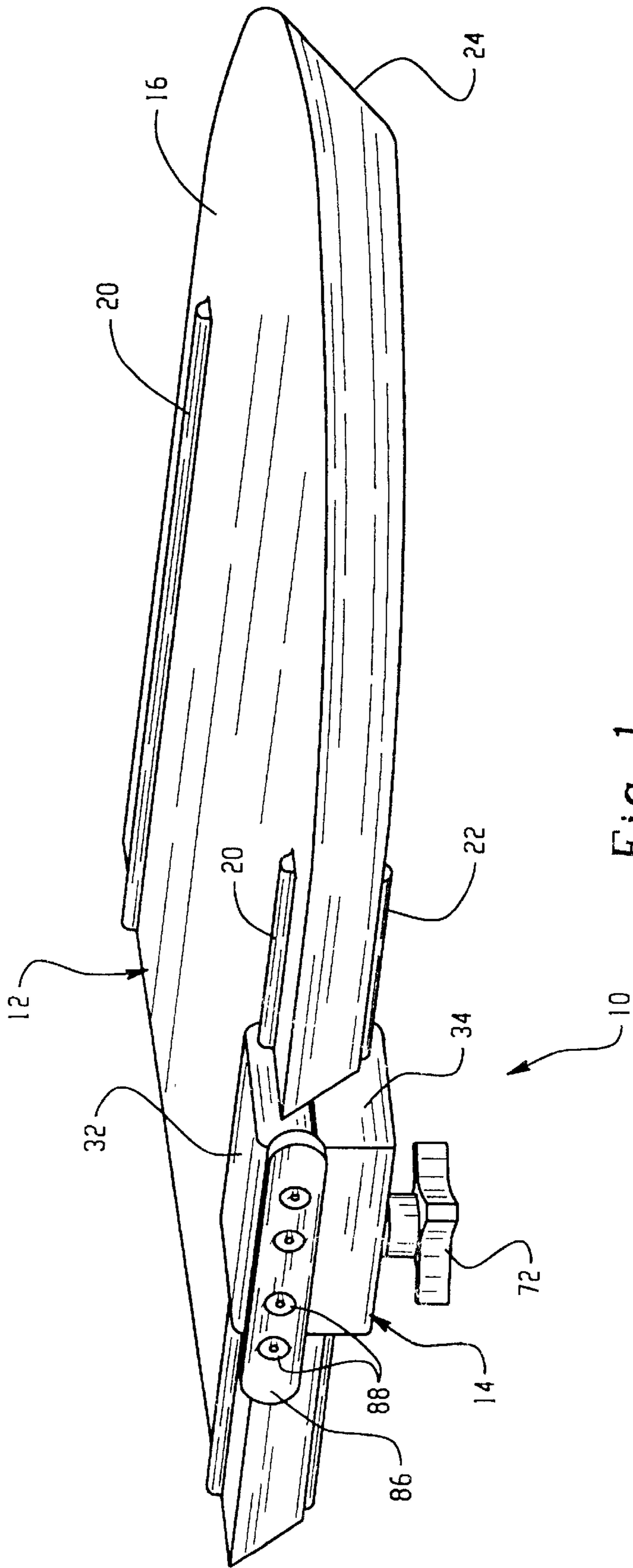


Fig. 1

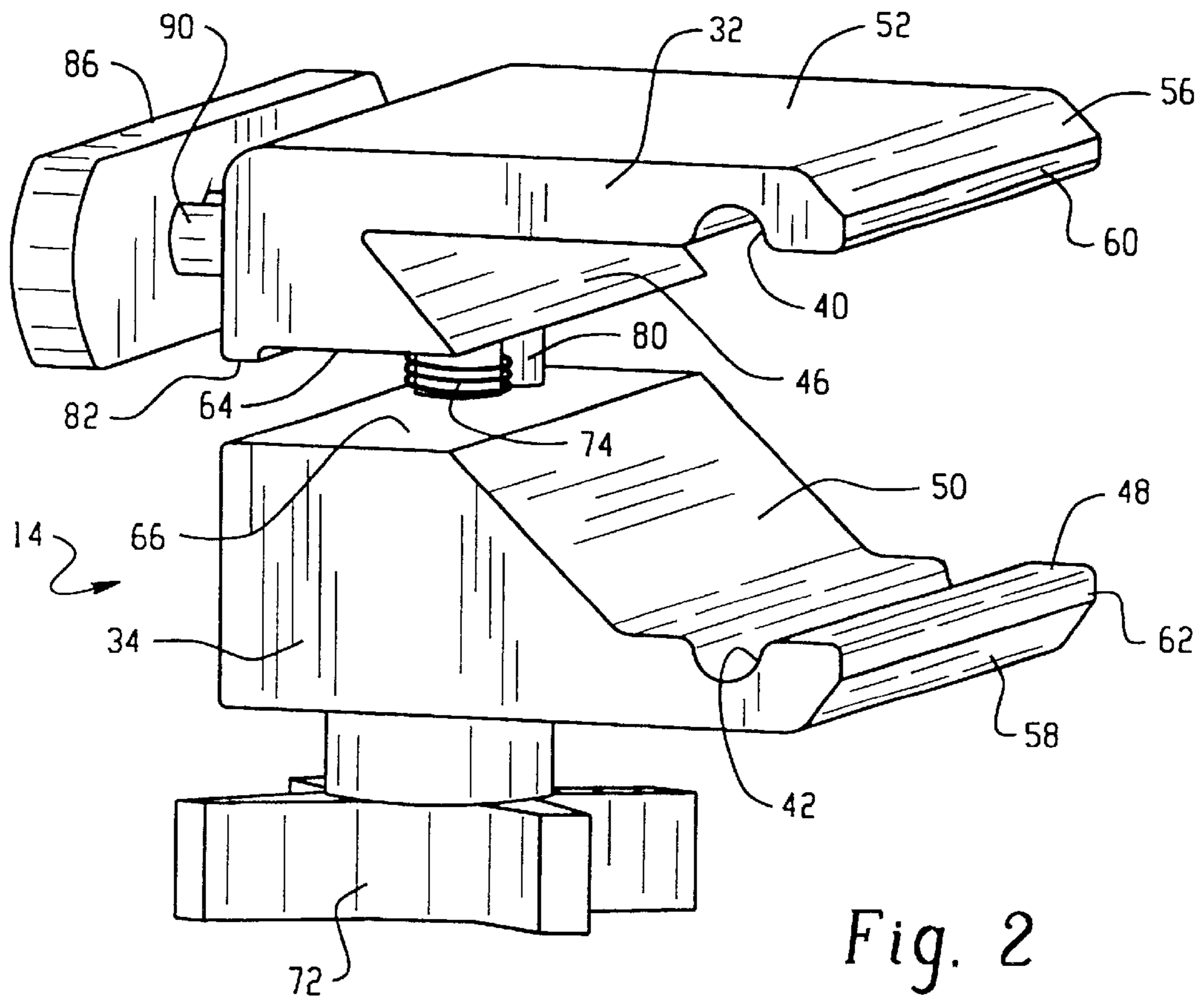


Fig. 2

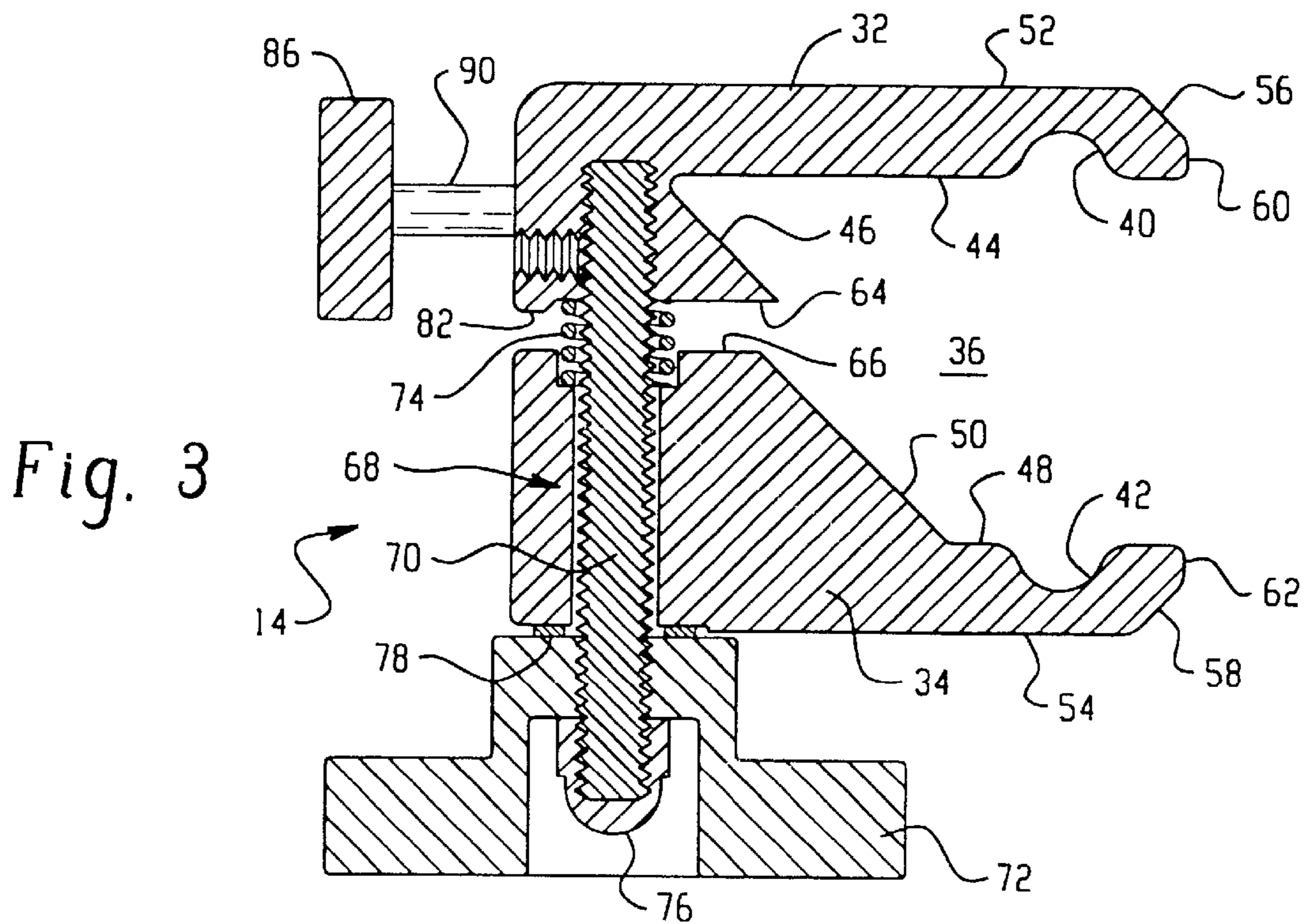


Fig. 3

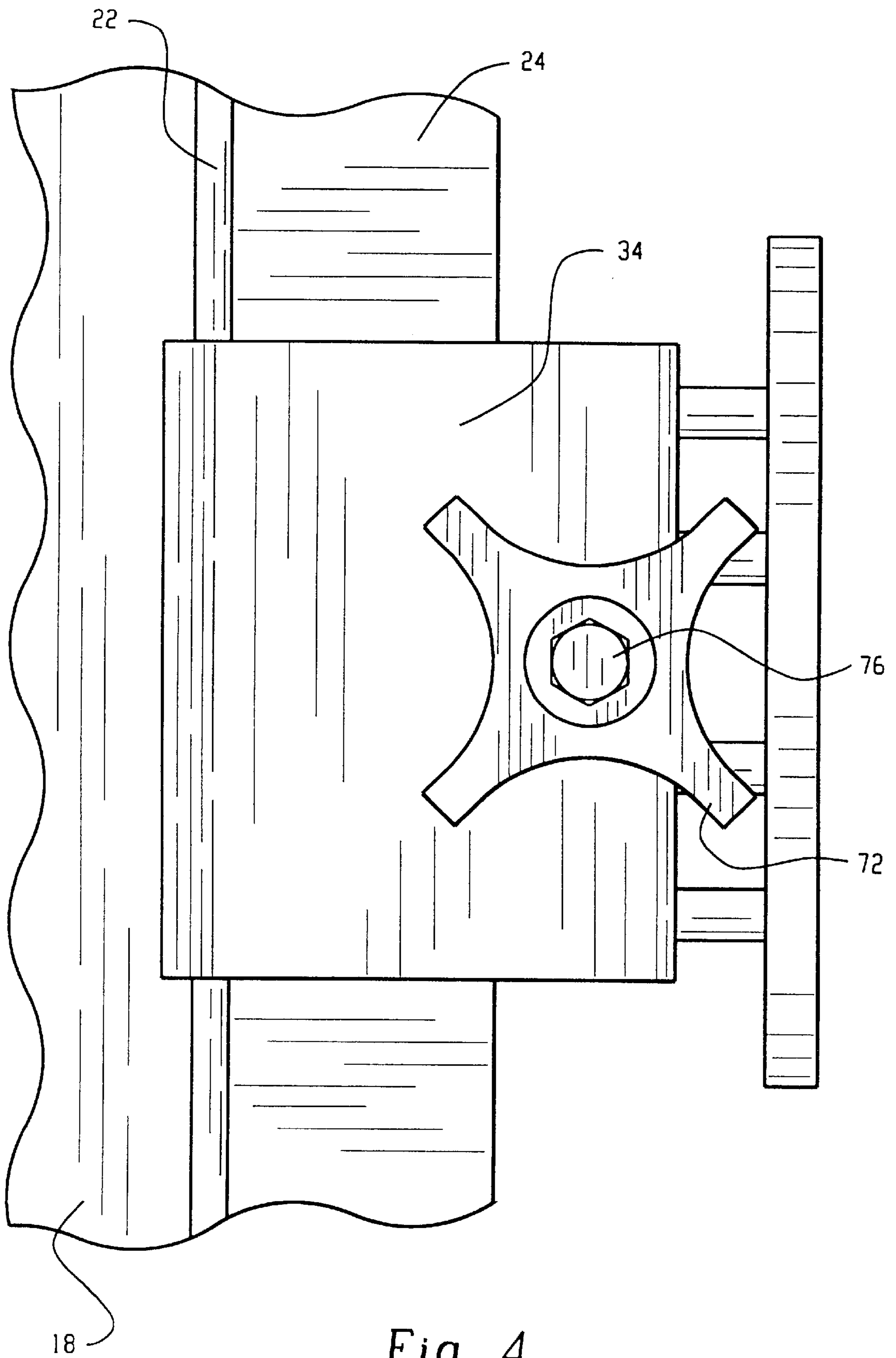


Fig. 4

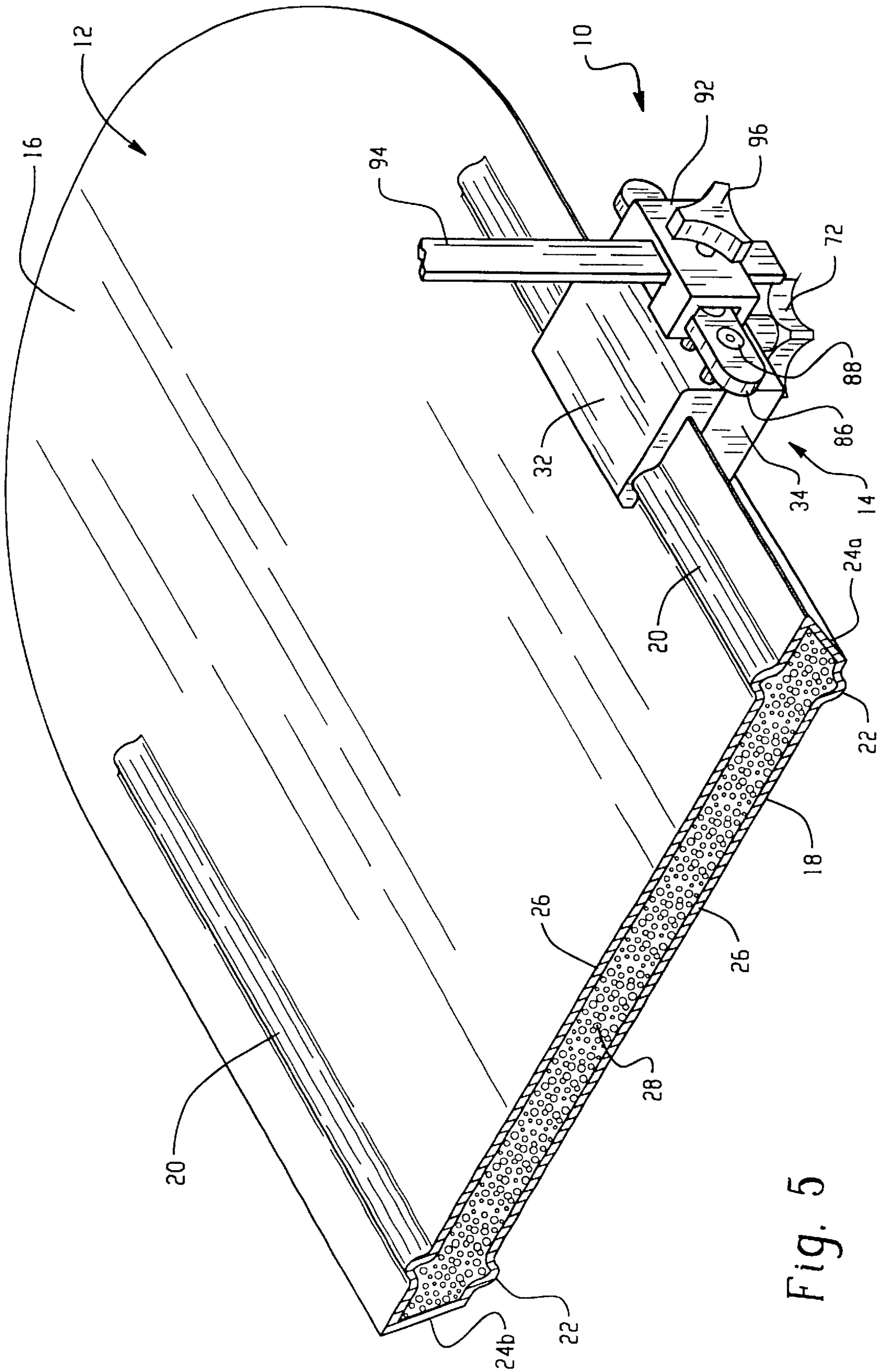


Fig. 5

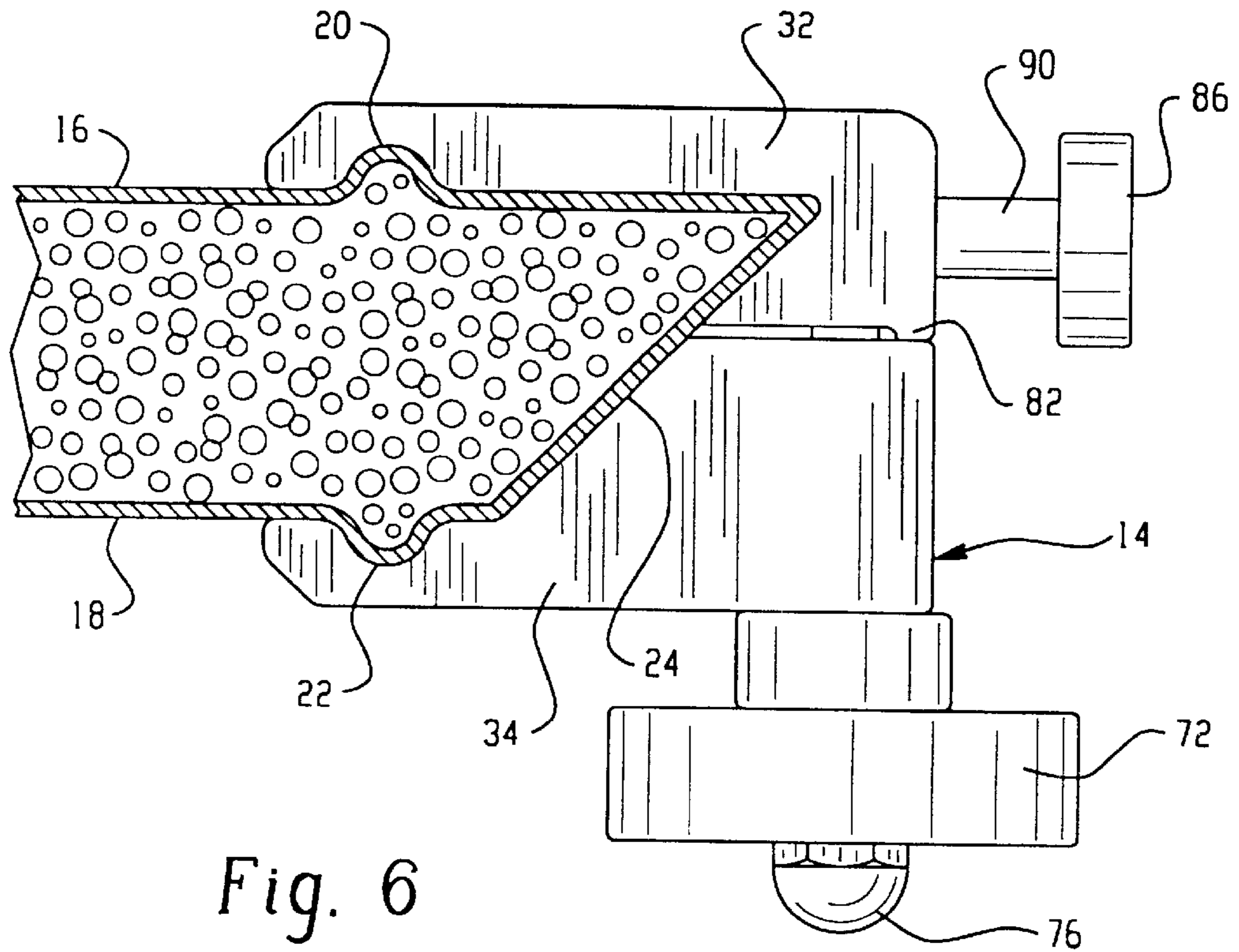


Fig. 6

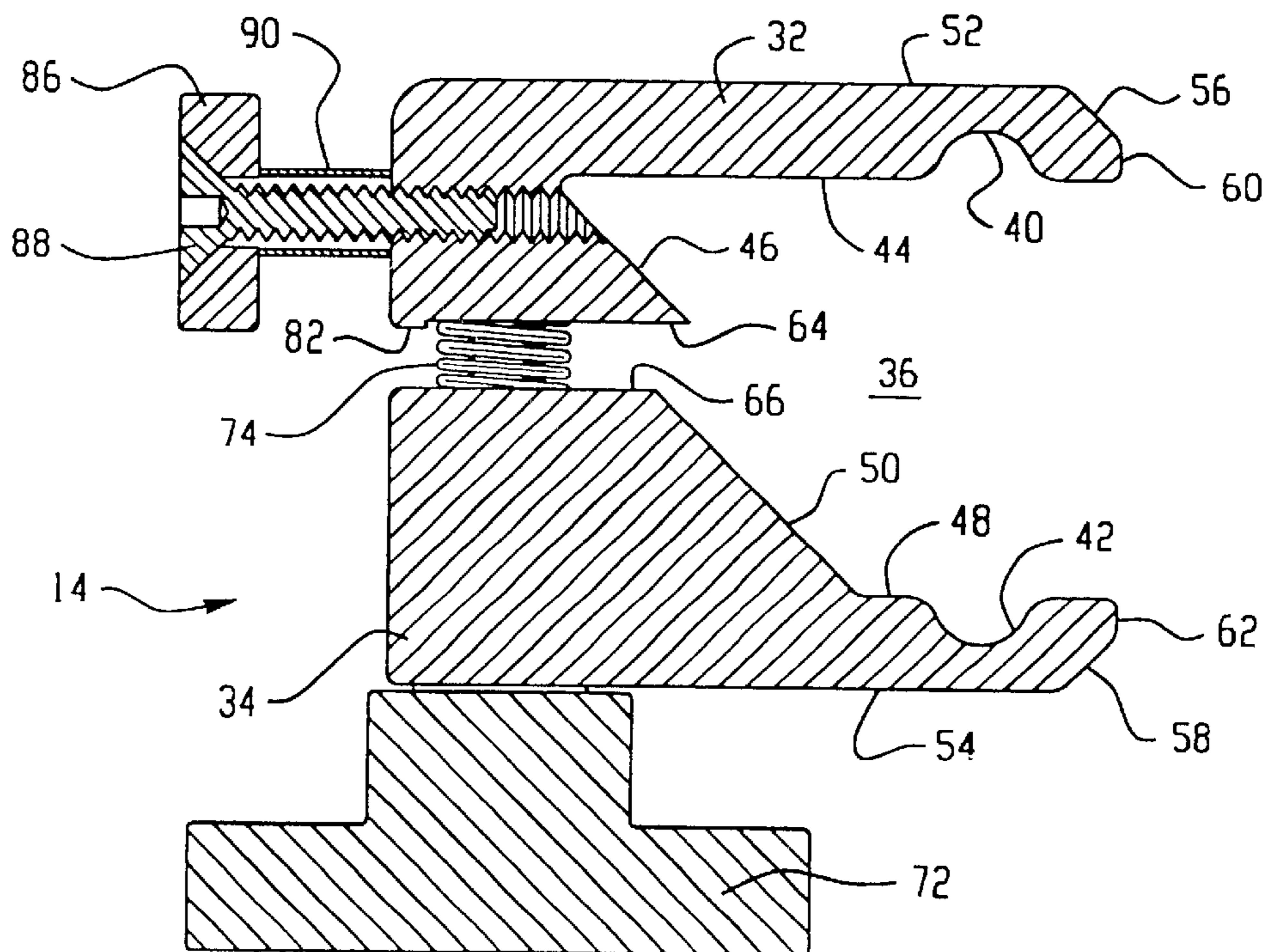


Fig. 7

## SURGICAL TABLE TOP AND ACCESSORY CLAMP USED THEREON

This a divisional of U.S. application Ser. No. 09/699,812, filed Oct. 30, 2000, now U.S. Pat. No. 6,499,158, priority to which is claimed under 35 U.S.C. §120.

### TECHNICAL FIELD

The present invention generally relates to a surgical table top and an accessory clamp for use therewith. More particularly, the present invention relates to a surgical table top having a geometric or beveled edge and at least one ridge on each of its upper and lower surfaces, and a clamp adapted to be attached to the table by receiving the geometric edge and the table's ridges.

### BACKGROUND OF THE INVENTION

Surgical table tops have been employed to perform a variety of procedures. Oftentimes, during these procedures, the patient requires fluoroscopy or other imaging procedure. Metal table tops or those with metal supports interfered with proper imaging of the patient. To that end, surgical table tops have more recently been constructed of radiolucent materials such as, for example, carbon fiber or other composites. Such table tops lacking metal components provided a patient supporting surface that did not interfere with imaging procedures.

Unfortunately, the radiolucent materials are unsuitable for supporting the attachment of accessories commonly required during medical procedures. For example, during surgical procedures, it is often necessary to use attachments, armboards, retractors, etc. for supporting the patient's limbs, trays for surgical instruments, specially designed surgical equipment, such as cameras, or robotic surgical devices, among others, in conjunction with the table top.

To accomplish this, known surgical table tops typically are provided with side rails permanently attached at opposite long sides of the table top. These rails provide an attachment point for accessories, which may be clamped or otherwise attached to the rails. While these rails were easily affixed to a conventional metal table top by fasteners, attachment to a composite table top, such as a carbon fiber composite table top, required metal inserts molded into the table top to receive those fasteners. The inserts were provided with threaded openings such that the rails could be fastened by screws and removed as necessary. Even with the rails removed, however, the metal inserts interfered with the results of the imaging process. Moreover, the metal inserts can create scatter radiation and require an increased amount of radiation and require an increased amount of radiation to be used, thereby cause potential safety problems.

Still further, since the rails extended the entire length of the table top, these rails hinder the surgeon's access to the table top. The rails prevent the surgeon and other persons providing treatment to the patient from standing immediately next to the table top. This may cause the treating personnel to function in an awkward position increasing fatigue or interfering with access to the surgical area.

To alleviate these concerns, at least one manufacturer has provided a removable clamp for a radiolucent surgical table top. Since the clamp relies on compressive force instead of fasteners for attachment to the table, the table top may be constructed without metal inserts. In this way, accessories may be removed prior to conducting imaging procedures such that the table top may be made free of metallic objects that would appear on the image if the x-ray field of view

were close. The presently known clamping device includes a generally C-shaped clamp having top and bottom legs held in spaced relation by a vertical side member. The legs and side members form a single solid member defining an open-ended channel that receives an edge of the table. A clamping bar supported on the bottom leg of the clamp is selectively moveable in the vertical direction to apply a compressive force to the table top when the table top is between the bar and the first leg. The clamping bar is made flat to engage a flat bottom surface of a surgical table top and the top leg angles downwardly defining a crook or a recess for receiving the raised edge of a conventional surgical table top. The flat clamping bar may be prone to lateral deviation because it is not restrained. This deviation may be most prevalent when the clamp is loosened for longitudinal movement. Deviation may be problematic when attempting to slide the clamp to a new position. Since the clamping bar is unrestrained in the lateral direction, it may deviate causing the upper portion of the clamp to rub against the raised edge on the upper surface increasing the effort necessary to move the clamp or in extreme cases the clamp may bind against the edge of the table top. This rubbing may also abrade or gouge the surfaces of the table top or its raised edge leading to further clamp-moving difficulty.

As a further disadvantage, the edges of most conventional surgical table tops are square. Despite the use of radiolucent material, when x-raying from an oblique angle, the squared edge of the conventional table appears on a fluoroscopic image as a thin line. As will be appreciated, this line may obscure important details of the image.

### SUMMARY OF THE INVENTION

It is, therefore, an aspect of the present invention to provide a surgical table top capable of having an accessory clamp removably mounted thereon.

It is another aspect of the present invention to provide an accessory clamp which is removable from an at least partially radiolucent surgical table top.

It is still another aspect of the present invention to provide a medical accessory clamping system comprising a surgical table top and a removably mounted accessory clamp, wherein the clamp is capable of supporting attachments thereto when mounted on the surgical table top.

At least one or more of the foregoing aspects, together with the advantages thereof over the prior art relating to medical equipment such as tables and clamps, which shall become apparent from the specification which follows, are accomplished by the invention as hereinafter described and claimed.

In general, the present invention provides a medical accessory clamping system including a table top having an upper surface and a lower surface, and at least a first ridge positioned on the upper surface and at least a second ridge positioned on the lower surface of the table; and an accessory clamp having a first clamping member and a second clamping member coupled to but separate from the first clamping member, the first and second clamping members defining a cavity for receiving a portion of the table top, the first clamping member having a first recess for receiving the first ridge and the second clamping member having a second recess for receiving the second ridge.

The present invention further provides a clamp for receiving a geometrically shaped article, the clamp including a first clamping member having a first recess; and a second clamping member having a second recess and being operatively coupled to but separate from the first clamping member,



wherein the first and second clamping members and their respective recesses define a cavity for receiving the geometrically shaped article such that the recesses engage at least a portion of the geometrically shaped article.

The present invention further provides a medical table top including an upper surface, a lower surface, at least a first ridge positioned on the upper surface near the periphery of the table top, and at least a second ridge positioned on the lower surface near the periphery of the table top. At least a patient receiving portion of the table top may be made from radiolucent materials.

#### BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of the medical accessory clamping system according to the present invention wherein a removable accessory clamp is attached to a surgical table top.

FIG. 2 is a perspective view depicting a accessory clamp in an open position.

FIG. 3 is an end view of the accessory clamp of FIG. 2 shown in cross-section through the coupling mechanism of the clamp.

FIG. 4 is a bottom elevational view of the accessory clamp of FIG. 1 attached to the table top shown partially cut away.

FIG. 5 is a perspective view of the medical accessory clamping system showing a medical accessory (partially cut away) supported on a surgical table top (also partially cut away) by an accessory clamp according to the concepts of the present invention.

FIG. 6 is a end view of the accessory clamp attached to a table top shown in cross section.

FIG. 7 is an end view of the accessory clamp of FIG. 2 shown in cross-section through the accessory rail connecting mechanism of the clamp.

#### DETAILED DESCRIPTION

In the description which follows like parts are marked throughout the specification and drawing figures with the same reference numerals, respectively. The drawing figures are not necessarily to scale and certain elements may be shown in schematic or generalized form or omitted from certain views in the interest of clarity and conciseness.

A representative medical accessory clamping system according to the concepts of the present invention is generally shown in FIGS. 1 and 5 and is generally indicated herein to by the numeral 10. This clamping system 10 generally includes a table top, referred to generally by the numeral 12, and an accessory clamp, referred to generally by the numeral 14.

Table top 12 is used to support a patient in need of care, such as for purposes of surgery or the like. It has an upper surface 16 and a lower surface 18, on which are positioned at least a set of first and second ridges, 20 and 22 near the periphery of each surface 16 and 18, respectively. First and second ridges 20, 22 may be of any shape or cross-section capable of receiving or attaching and/or, more preferably, capable of permitting the guiding movement of the accessory clamp 14 as described hereinbelow, while holding the clamp in a rigid and stable manner. To reduce the likelihood of clothing or other items catching on ridges 20, 22, they are preferably smooth as shown in FIG. 5. Each ridge may have the same or different shape from another depending upon the construction of the table top, and may be made integral with or separate from the table top itself. Each ridge may be continuous or made of discrete sections collinear with each other.

Each first ridge 20, formed on the topside 16 of table top 12 is generally positioned near the perimeter or periphery of the upper surface 16 and preferably extends substantially along the entire length of table top 12, or at least along the length of that portion of the table top defined herein as the patient receiving portion. Each second ridge 22 may be similarly formed on the underside 18 of the table top 12 and preferably extends substantially vertically parallel to its opposed first ridge 20 along the entire length of the table top 12, or at least along the length of the patient receiving portion of the table top 12.

The table top 12 further includes a side edge 24 connecting the periphery of each surface. For purposes of clarity, the side edge 24 will be differentiated as a first side edge 24a defining the right hand side of the table top 12 and a second side edge 24b defining the left hand side of the table top 12.

In a preferred embodiment and as shown in at least FIG. 5, a pair of first ridges 20 are formed on the upper surface 16 of the table top 12, both first ridges 20 being parallel to one of the respective side edges 24a or 24b of the table top 12. Similarly, as best seen in FIG. 5, a pair of second ridges 22 are formed on the lower surface 18 of the table top 12, with each second ridge 22 being parallel to one of the respective side edges 24a, 24b of the table top 12.

As best shown in FIGS. 1 and 6, side edge 24 is preferably irregular to the extent that it is not a vertical edge between the surfaces of table top 12. To that end, the side edge 24 may be straight, curved or staggered. Preferably, side edge 24 is beveled, extending downwardly and inwardly from the upper surface 16 to the lower surface 18. More particularly, the beveled edge 24 is angled at approximately 45°. Such an angle promotes better image visualization and gives the user the ability to make a more accurate diagnosis when imaging a patient at the edge of the table top, specifically long the beveled edge in an anterior/posterior position. That is, the beveled edge reduces the dominance of the side of the table 12 in oblique fluoroscopic or x-ray images. In imaging with a 90° edge of a table top, the vertical edge may still appear as a thin line on a fluoroscopic image.

As noted hereinabove, it may become desirable to perform imaging, such as x-rays, during procedures performed on patient. To facilitate this, radiolucent materials may be substituted for conventional stainless steel or aluminum in the construction of at least a major portion, if not the entirety of the table top 12, so as to create a metal-free imaging area. In a preferred embodiment, the table top is capable of supporting a 500 lb. patient weight capacity with no metal included in at least 55 inches of its preferred 92-inch length. This 55-inch portion is referred to hereinafter as a patient receiving portion and is preferably constructed of carbon fibers or other radiolucent materials. That is, the patient receiving portion, which is essentially the entire table top portion shown in FIGS. 1 and 5 and is therefore not renumbered, is constructed entirely of carbon fiber or, as shown, of a carbon fiber shell 26 surrounding a foam 28 interior.

It will be appreciated that table top 12 may be mounted on a base (now shown) as is known in the art. The base may take any form conventional in the art including that of a single pillar, a plurality of legs or other supporting structures used to support the table top 12. Alternatively, the table top could even be suspended by various suspension mechanisms. In addition, the table base itself may be stationary or mobile as necessary, while the table top 12 may also be stationary or moveable with respect to the base. In a preferred embodiment, at least the patient supporting portion of

the table top **12** is cantilevered from the base such that there is nothing beneath that portion of the table top **12**. With the patient supporting portion in this arrangement, the table top **12** provides a large surface usable for taking x-rays or other imaging.

The table top **12** of the present invention, like other conventional table tops, may further include strap retainers (not shown) attached to the table top. Such strap retainers, used to maintain any straps that may be used to restrain the patient to the table top, are also preferably constructed of similar radiolucent materials to lessen the chances of interference with imaging. Strap retainers, where used, are typically placed on the underside **16** of the table top **12** in pairs at or near the side edges **24**. These strap retainers also may be made removable from the table top **12** allowing complete removal of the retainers during imaging or whenever removal is desired.

The other major part of the medical accessory clamping system of the present invention is the clamp **14**. It will be appreciated that, given the uniquely constructed table top **12**, a conventional clamp, such as one with a square opening or a standard C-clamp, is basically unusable and will not adequately clamp to the irregular side edges **24** of the table top **12**. The clamp **14** of the present invention solves this problem, and can be of any size or configuration useful in the art.

The accessory clamp **14** of the present invention, depicted best in FIGS. **2**, **3**, **6** and **7**, includes at least a first clamping member **32** and a second clamping member **34** coupled to but separate from or independent of the first clamping member **32**. These first and second clamping members **32**, **34** define a cavity **36** for receiving at least the side edge **24** of the table top **12** or other geometrically shaped article needing clamped. Notably, the first clamping member **32** includes a first recess **40** for receiving the first ridge **20** of the table top **12** and the second clamping member **34** includes a second recess **42** for receiving the second ridge **22** of said table top **12**, the recesses **40**, **42** also forming a part of the cavity **36**.

In a preferred embodiment, the cavity **36** defined by at least the first and second clamping members **32**, **34** is of a geometry that substantially conforms to that portion of the table top **12** received by the cavity **36**. In other words, cavity **36** is preferably defined by the first clamping member **32** having a first clamping surface **44** with the first recess **40** defined therein and a tapered conforming surface **46** extending from the first clamping surface **44** distal to the open end of the cavity **36**, while the second clamping member **34** likewise has a second clamping surface **48** with the second recess **42** defined therein and another tapered conforming surface **50** extending from the second clamping surface **48** distal to the open end of the cavity **36**. In order to conform to the geometry of the table top **12**, first clamping surface **44** with its first recess **40** and second clamping surface **48** with its second recess **42** are in opposed, essentially parallel relationship to each other and engage the upper and lower surfaces **16**, **18** of the table top, respectively. As such, first and second recesses **40**, **42** also engage their mating ridges **20**, **22** on the upper and lower surfaces **16**, **18** of the table top **12** and are preferably vertically planar to each other. That is, a first recess **40** engaging a first ridge **20** of the table top **12** and an opposed second recess **42** engaging a second ridge **22** of the table top **12** are all in vertical alignment. Further, tapered conforming surfaces **46** and **50** each conform to the beveled angle of the side edge **24** of the table top **12** and are more particularly aligned to be co-planar with each other when the clamp **14** is closed and clamped to the table top **12**.

The clamping and conforming surfaces **44**, **46**, **48** and **50** defining cavity **36** of the clamp **14** thus essentially mirror those surfaces and side edges of the table top **12**. It is believed that this arrangement spreads the clamping forces over a larger surface area on the table top **12** thereby reducing the likelihood of localized deformation including gouging of these surfaces by excessive application of clamping force.

Clamping members **32**, **34** may generally be of any dimension, size or shape provided that they are large enough to define a cavity **36** suitable for receiving the side edge **24** of the table top **12**. Furthermore, the clamping members **32**, **34** may have any surface characteristics, but preferably their surfaces machined relatively smooth with the edges rounded over or tapered to reduce a likelihood of a patient's or medical personnel's clothing or bodies from being snagged on the clamp **14**. For example, both the first and second clamping members **32**, **34** include a generally smooth external surface **52**, **54**, respectively, which then gradually tapers toward the cavity **36** as an angled surface **56**, **58**, respectively, to an end surface **60**, **62**, respectively, the end surfaces **60**, **62** being adjacent the first and second clamping surfaces **44**, **48**, respectively, at the mouth of cavity **36**.

When used with the table top **12** having first and second ridges **20**, **22**, the first and second clamping members **32**, **34**, by way of their first and second recesses **40**, **42** communicate with and otherwise engage these ridges. Preferably the recesses and the ridges are rounded and smooth to allow for the gliding of the clamp **14** along the table top without having to remove the clamp **14** completely. That is, the rounded, smooth surfaces of the recesses **40**, **42** are generally of any shape capable of engaging the like smooth surfaces of the ridges **20**, **22** and are sized such that they conform closely to the width of the ridges **20**, **22**, thereby allowing the clamp **14** to glide or slidingly move along the length of the table top **12**, if not clamped tightly.

In addition to the surfaces already discussed, first and second clamping members **32**, **34** also include opposing parallel surfaces **64** and **66** which define a bore therein for receiving a coupling mechanism **68**. The coupler **68** may be any known mechanism suitable for bringing the clamping members **32**, **34** into clamped engagement with table top **12** or for releasing the clamping members **32**, **34** from the table top **12**. Examples of known couplers include but are not limited to screws, levers, gears, ratchet or cam mechanisms. As will be understood, the means for actuating or coupling the first and second clamping members **32**, **34** are well known and any of these conventional couplers may be substituted within clamp **14** with little modification. Thus, while only one exemplified embodiment of a coupler is shown in the drawings, any conventional coupler or actuator may be used in accordance with the spirit of this invention.

As shown in the drawings, a coupler, generally referred to by the numeral **68**, is received by first and second clamping members **32**, **34**. Coupler **68** more particularly for this embodiment includes a threaded shaft **70** running between the first and second clamping members **32**, **34** and a knob **72** rotatably mounted to the shaft **70** adjacent one of the clamping members and distal to the other of the clamping members. A spring **74** biases the clamping members **32**, **34** apart, but rotation of the knob **72** causes the knob **72** to move axially along the threaded shaft **70**, bring the clamping members **32**, **34** closer together or farther apart. Rotational direction of knob **72** controls the selective opening or closing of the clamping members **32**, **34**.

The spring **74** is preferably a helical spring and is compressed between first and second clamping members **32**, **34**

such that it exerts an axial outward force against each of the clamping members 32, 34 that aids in driving the clamping members 32, 34 apart when the knob 72 is loosened. While spring 74 may simply rest between clamping members 32, 34, a spring recess may be formed within one or both of the clamping members 32, 34 to receive and radically confine either or both of the ends of spring 74 thereby aiding in the proper positioning of spring 74.

A nut or other stop mechanism 76 is also shown to prevent the knob 72 from coming off of the threaded shaft 70. The stop mechanism 76 may be made adjustable to selectively control movement of the knob 72.

In the embodiment shown in FIG. 3, clockwise rotation of knob 72 moves clamping members 32, 34 toward each other and counter clockwise rotation allows the clamping members 32, 34 to move away from each other. A washer 78 may be mounted between the knob 72 and the lower surface 54 of second clamping member 34 to prevent contact between the rotating knob 72 and lower surface 54 that might gouge or otherwise abrade the lower surface 54. Additionally, washer 78 may reduce the likelihood of knob 72 binding when fully tightened. The lower surface 54 of second clamping member 34 may be recessed to at least partially receive washer 78 when knob 72 is tightened. It will also be appreciated that, while the knob 72 is shown beneath the second clamping member 34, knob 72 may be placed in other locations including the upper surface 52 of first clamping member 32 or at other exterior surfaces of the clamp 14. As previously discussed, other structures may be used to actuate or couple the clamping members 32, 34 between open and closed positions and the location of the actuator/coupler 68 may vary accordingly.

As shown in FIG. 2, a post 80 may be housed between first and second clamping members 32, 34 to prevent relative rotation thereof caused by torquing of knob 72 and maintaining longitudinal alignment of the clamping members 32, 34. Additional posts may be added to further aid in the alignment of these members, and absorb torque created by actuation of knob 72. Post 80 is spaced from threaded shaft 70 and held in a fixed location in a plane parallel to the threaded shaft 70. In the depicted embodiment, post 80 is sized such that it maintains simultaneous contact with first and second clamping members 32, 34 when these members are in the fully open position such that post 80 acts as a rotational stop throughout actuation of the clamp 14. It is foreseeable, however, that such stopping action may not be strictly required at all points during vertical movement of the members 32, 34, such as the open position when the clamp 14 is being removed. Thus, post 80 need not extend into both clamping members 32, 34 when clamp 14 is opened. Post 80 may also be of any cross-section and have any shape provided that it does not unduly interfere with movement of the clamping members 32, 34 between open and closed positions.

As will be appreciated, some irregularities in the surfaces of table top 12 may be present. Accordingly, the clamp 14 may be provided with some structure which will enable it to accommodate these irregularities. For example, as best shown in FIGS. 2, 3 and 7, a protrusion 82 may be formed on one of said surfaces 64 or 66 of said first or second clamping members to provide lateral play. Protrusion 82 may extend the entire length of clamp 14, or it may extend to a lesser extent, or be formed by a plurality of staggered protrusions. The protrusion 82 may be of any shape or cross-section, although the outermost portion should be flat for engagement with the other surface of the opposing clamping member.

As shown in FIG. 6, when clamping members 32, 34 are brought into clamping engagement, protrusion 82, here positioned on and extending from surface 64 of the first clamping member 32, engages the surface 66 of second clamping member 34 leaving a very small gap adjacent the protrusion 82. The gap allows play in the lateral direction between the clamping members 32, 34 to allow the clamping members 32, 34 to adjust to irregularities in the surfaces 16, 18 of the table top 12 or ridges 20, 22. Moreover, as shown, protrusion 82 is formed at an outside edge of the surface 64 or 66 of said first or second clamping member 32, 34.

In the longitudinal direction, play may preferably be introduced by using only a single post 80 located on one side of a centrally positioned coupler 68. In this way, the angular movement of the clamping members 32, 34 in the longitudinal direction is somewhat restricted on one side by the post 80, but unrestricted on the post-free side. This freedom allows angular play over the length of the clamp 14 accommodating irregularities in the clamped, geometrically shaped article found along the length of the clamp 14. By introducing some play between the clamping members 32, 34, contact may occur between the clamping members 32, 34 without unduly deforming the article when an irregularity would cause the article to be slightly larger than the cavity 36. When not relying on play, a slight loosening of knob 72 allows the gap to open and clamp member 14 may be more easily slid along ridges 20, 22, or removed altogether. That is, loosening knob 72, opens clamp member 14 by separating clamping members 32, 34. To remove the clamp 14, the clamping members may be opened sufficient wide to allow the clamp 14 to be removed from the table top over the ridges 20, 22, or may be opened to allow sliding movement along the table top. In other words, the clamp 14 may be clamped over the table top 12 by opening the clamping members wide enough to permit placement of the clamp 14 on the table top 12, or may be slidingly positioned on the table. Of course, either method may be used to remove the clamp as well.

The clamp 14 further may include an accessory rail 86 for attaching accessories to the clamp. Such a rail 86 is essentially a shorter version of the conventional rails typically used in attaching accessories to surgical table tops. The rail 86 may be mounted to the clamp 14 by any manner known in the art. In the preferred embodiment shown in FIG. 7, the rail 86 is attached to the first clamping member 32 by a plurality of threaded screws or other fasteners 88 received through bores located in the back of the clamping member 32. In order to protect the threads of the screw 88 and to provide supporting strength to the rail 86, a spacer 90 is preferably positioned around each screw 88 between the rail 86 and the first clamping member 32 so as to space apart the rail 86 from the clamp 14.

Retractors, arm extensions, or other known accessories (not shown) may be directly attached to rail 86 of clamp 14, or as shown in FIG. 5, may be provided with a mounting bracket 92 that provides a point of attachment for these accessories. In the embodiment shown, the bracket 92 is attached to rail 86 of first clamping member 32 by a well known technique. Bracket 92 is preferably attached such that top surface of the bracket 92 is approximately at the same approximate height as the top surface 52 of first clamping member 32. The bracket 92 is generally an elongated member that provides sufficient area and structure for the attachment of an accessory such as 94. For example, as shown in FIG. 5, the bracket may include a rotational piece 96 for tightening or loosening the accessory 94 from the bracket 92 or the bracket 92 from the rail 86.

It should therefore be apparent that the present invention reduces interference with imaging by providing a table top having a geometric side edge and a removable clamp for mounting accessories to this side edge. The present invention further provides more secure attachment of the clamp to a table top. It is, therefore, to be understood that any variations evident fall within the scope of the claimed invention and thus, the selection of specific component elements can be determined without departing from the spirit of the invention herein disclosed and described. Thus, the scope of the invention shall include all modifications and variations that may fall within the scope of the attached claims.

What is claimed is:

1. A medical table top having a periphery defined by edges, comprising: an upper surface, a lower surface, at least a first ridge positioned on said upper surface near the periphery of the table top; and at least a second ridge positioned on said lower surface near the periphery of the table top, said ridges being spaced inwardly from said edges, and being adapted to releasably retain an associated clamp.

2. The medical table top of claim 1 wherein the table top has a first side edge and a second side edge, wherein a pair of first ridges are formed on the upper surface of the table top, each first ridge being parallel to one of said side edges of the table top; and wherein a pair of second ridges are formed on the lower surface of the table top, each second ridge being parallel to one of said side edges of the table top.

3. The medical table of claim 2, wherein said side edges of the table top are beveled.

4. The medical table of claim 1, wherein the table top includes a portion for receiving a patient wherein said portion is constructed entirely of radiolucent materials.

5. The medical table of claim 4, wherein said patient receiving portion is at least 55 inches in length and is constructed entirely of carbon fibers.

6. The medical table top of claim 1, wherein said edges are beveled.

7. The medical table top according to claim 6 wherein said beveled edges are arranged at an angle of about 45 degrees relative to said upper surface of said table top.

8. The medical table top according to claim 1 wherein said first and second ridges are vertically planar relative to each other on opposite sides of the table top.

9. The medical table top of claim 1 wherein said first ridge has a first shape and the second ridge has a second shape different from said first shape.

10. The medical table top of claim 1 wherein said first ridge has a shape substantially the same as said second ridge.

11. The medical table top of claim 1 wherein at least one of said first and second ridges are continuous.

12. The medical table top of claim 1 wherein at least one of said first and second ridges are formed of discreet colinear sections.

13. The medical table top of claim 1 wherein said first and second ridges extend substantially along the entire length of said table top.

14. The medical table top of claim 1 wherein at least one of said first and second ridges are integral with said table top.

15. The medical table top of claim 1 wherein at least one of said first and second ridges are separate from said table top.

16. The medical table top of claim 1 wherein at least one of said first and second ridges are arranged on said upper and lower surfaces, respectively, to extend in parallel with said edges.

17. The medical table top of claim 1 wherein said edges are straight.

18. The medical table top of claim 1 wherein said edges are curved.

19. The medical table top of claim 1 wherein said edges are staggered.

20. The medical table top of claim 1 wherein:

said table top defines a patient receiving portion; and, said first and second ridges extend substantially along the length of said patient receiving portion.

21. The medical table top of claim 1 wherein said table top is formed of a radiolucent material.

22. The medical table top of claim 21 wherein said table top is formed of carbon fiber.

23. The medical table top of claim 21 wherein said table top is formed of a foam interior surrounded by a carbon fiber shell.

24. The medical table top of claim 1 further including a base supporting said table top relative to an associated support surface, at least a patient supporting portion of said table top being cantilevered from said base to permit imaging of patients disposed on said patient supporting portion.

25. A surgical table comprising:

a table top having an upper surface, a lower surface, a side edge, a first ridge positioned on said upper surface and spaced inwardly from said side edge, and a second ridge positioned on said lower surface of the table top and spaced inwardly from said side edge, the first and second ridges being adapted to connect with an associated clamp.

26. The surgical table according to claim 25 wherein a pair of said first ridges are formed on the upper surface of the table top, each of the first ridges being parallel to said side edge; and wherein a pair of said second ridges are provided on said lower surface of the table top, each of the second ridges being parallel to said side edge.

27. The surgical table according to claim 26 wherein said side edge is beveled.

28. The surgical table according to claim 25 wherein the table top includes a portion for receiving a patient wherein said portion is constructed entirely of radiolucent materials.

29. The surgical table according to claim 28 wherein the patient receiving portion is at least 55 inches in length and is constructed entirely of carbon fibers.

30. The surgical table of claim 25, wherein said side edge is beveled.

31. The surgical table according to claim 30 wherein said beveled edge is arranged at an angle of about 45 degrees relative to said upper surface of said table top.

32. The surgical table according to claim 25 wherein said first and second ridges are vertically planar to each other on opposite sides of the table top.

33. The surgical table of claim 25 wherein said first ridge has a first shape and the second ridge has a second shape different from said first shape.

34. The surgical table of claim 25 wherein said first ridge has a shape substantially the same as said second ridge.

35. The surgical table of claim 25 wherein at least one of said first and second ridges are continuous.

36. The surgical table of claim 25 wherein at least one of said first and second ridges are formed of discreet colinear sections.

37. The surgical table of claim 25 wherein said first and second ridges extend substantially along the entire length of said table top.

38. The surgical table of claim 25 wherein at least one of said first and second ridges are integral with said table top.

39. The surgical table of claim 25 wherein at least one of said first and second ridges are separate from said table top.

11

40. The surgical table of claim 25 wherein at least one of said first and second ridges are arranged on said upper and lower surfaces, respectively, to extend in parallel with said side edge.

41. The surgical table of claim 25 wherein said side edge is straight. 5

42. The surgical table of claim 25 wherein said side edge is curved.

43. The surgical table of claim 25 wherein said side edge is staggered. 10

44. The surgical table of claim 25 wherein:  
said table top defines a patient receiving portion; and,  
said first and second ridges extend substantially along the  
length of said patient receiving portion.

12

45. The surgical table of claim 25 wherein said table top is formed of a radiolucent material.

46. The surgical table of claim 45 wherein said table top is formed of carbon fiber.

47. The surgical table of claim 45 wherein said table top is formed of a foam interior surrounded by a carbon fiber shell.

48. The surgical table of claim 25 further including a base supporting said table top relative to an associated support surface, at least a patient supporting portion of said table top being cantilevered from said base to permit imaging of patients disposed on said patient supporting portion.

\* \* \* \* \*